TABLE 4.—*Mean altitudes and temperatures of significant points identifiable as tropopauses during September 1939, classified according to the potential temperatures (10-degree intervals between 300° and 409° A.) with which they are identified. (Based on radiosonde observations)*—Continued.

Potential temperatures A.	Oklahoma City, Okla.			Omaha, Nebr.			Phoenix, Ariz.			San Juan, P. R.			Sault Ste. Marie, Mich.			St. Louis, Mo.			Spokane, Wash.			Swan Island, W. I.		
	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature	Number of cases	Mean altitude	Mean temperature
310-319				1	7.7	−34.0							4	7.5	−34.3				2	8.2	−38.0			
320-329	3	9.4	−40.3	8	9.9	−45.8							22	10.2	−52.7	2	10.8	−53.5	18	9.9	−47.6			
330-339	8	10.7	−46.8	16	10.1	−41.9	5	10.8	−46.6	3	11.2	−51.6	19	11.3	−56.2	17	10.9	−49.5	24	11.2	−54.8			
340-349	17	12.1	−53.9	17	12.1	−55.0	15	11.8	−50.5	10	12.3	−55.9	8	11.8	−54.9	17	12.3	−57.2	11	12.3	−58.7	9	12.9	−61.1
350-359	14	13.4	−59.9	12	13.2	−58.2	17	13.5	−61.2	13	13.4	−61.3	5	13.1	−61.0	9	13.8	−64.3	4	13.2	−61.8	25	14.3	−69.7
360-369	13	14.7	−66.5	8	14.2	−62.5	11	14.8	−67.3	14	14.7	−66.5	8	14.0	−62.1	11	14.9	−70.1	3	13.6	−59.3	16	15.4	−73.4
370-379	7	15.7	−70.6	9	15.3	−67.2	13	15.7	−69.9	5	15.6	−71.0	3	14.3	−60.0	9	15.0	−66.3	4	14.6	−61.2	10	16.1	−76.4
380-389	9	15.0	−69.8	7	15.8	−67.4	10	16.4	−71.9	7	16.5	−73.6	3	15.7	−66.3	6	16.1	−71.0	3	15.0	−62.0	6	16.9	−76.3
390-399	5	16.8	−71.4	12	16.3	−67.3	7	16.7	−70.6	6	16.9	−72.0				10	16.2	−68.8	3	15.8	−62.7	1	17.2	−77.0
400-409	3	17.6	−72.7	2	17.2	−70.5	5	17.4	−71.6	2	17.2	−72.5	1	16.3	−63.0	5	16.9	−68.8				5	17.7	−77.4
Weighted means		13.7	−60.9		13.1	−56.9		14.2	−60.7		14.5	−64.8		11.6	−54.6		13.8	−61.9		11.7	−54.7		15.1	−71.6
Mean potential temperature (weighted)	360.5			357.4			362.3			364.6			340.5			360.5			342.5			364.6		

LATE REPORTS FOR AUGUST 1939

Altitude (meters) m. s. l.	Bismarck, N. Dak. (508 m.)				Charleston, S. C. (14 m.)				Sault Ste. Marie, Mich. (221 m.)				Altitude (meters) m. s. l.	Bismarck, N. Dak. (508 m.)				Charleston, S. C. (14 m.)				Sault Ste. Marie, Mich. (221 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	955	15.9	70	30	1.014	22.6	95	30	988	14.3	95	10,000	29	279	−43.0		28	288	−33.6	40	29	277	−43.7	
500					30	959	23.1	79	30	956	16.0	82	11,000	29	241	−48.9		28	249	−41.3		29	238	−49.6	
1,000	31	902	20.4	49	30	905	21.0	75	30	901	14.6	77	12,000	29	206	−53.8		28	215	−48.9		29	204	−53.7	
1,500	31	851	17.6	48	30	854	18.0	74	30	849	11.6	79	13,000	29	176	−56.5		27	184	−55.8		29	174	−55.7	
2,000	31	802	14.2	52	30	806	15.3	73	30	800	8.8	78	14,000	28	150	−57.8		24	157	−61.6		29	149	−57.2	
2,500	31	756	10.8	54	30	760	12.6	71	30	753	6.3	71	15,000	27	128	−58.8		24	133	−65.9		29	127	−58.3	
3,000	31	711	7.8	53	30	716	10.0	69	30	708	3.6	66	16,000	23	109	−59.9		24	113	−68.3		27	108	−58.7	
4,000	31	630	1.4	48	30	634	4.5	67	30	625	−2.0	58	17,000	22	92	−60.0		23	96	−67.4		23	92	−58.3	
5,000	30	555	−5.5	44	30	561	−0.8	61	30	551	−7.5	48	18,000	21	79	−58.6		21	81	−65.5		14	78	−57.4	
6,000	30	488	−12.6	43	29	494	−6.4	57	29	484	−13.1	44	19,000	19	67	−56.6		19	68	−63.9		9	67	−56.0	
7,000	30	427	−19.8	41	29	434	−12.3	50	29	423	−20.3	42	20,000	14	57	−54.9		12	58	−62.2		6	57	−54.9	
8,000	30	373	−27.4	39	28	380	−18.8	46	29	369	−28.2	41	21,000	10	48	−52.9		8	49	−60.9					
9,000	30	323	−35.6	39	28	332	−25.8	46	29	320	−36.2	40	22,000	5	41	−51.9		8	42	−59.2					

RIVERS AND FLOODS

[River and Flood Division, MERRILL BERNARD in charge]

By BENNETT SWENSON

The principal floods during August and September 1939 occurred in the Southeastern States as the result of the passage inland of a tropical disturbance over extreme northwestern Florida on August 12–13. This disturbance remained practically stationary over Alabama until the 17th when it began to move slowly northeastward. Heavy precipitation accompanied the storm, the greatest amounts being recorded in extreme northwestern Florida and central and southern Alabama. Moderately heavy rains over Georgia, North and South Carolina, and portions of southern Virginia accompanied the slow northeastward progress of the disturbance.

An interesting feature of this cyclone of tropical origin was, that after its passage inland, it maintained an intense cyclonic circulation to very high levels for several days, the center of the circulation aloft being almost directly above the center at the surface. Pilot-balloon observations at Birmingham, Ala., on the 13th showed that east-southeast winds prevailed at all levels to and including 14,000 feet. At 12,000 feet the highest velocity, 63 miles per hour, was observed. At the same time, Pensacola, Fla., had west-northwest winds at the same levels with a maximum velocity of 54 miles per hour also at 12,000 feet.

Except for the region mentioned above, rains over the country during August were scattered and resulted mainly in minor flooding in Kansas and some local floods in southern New Mexico.

September was unusually dry over the country except for the extreme Southwestern States, which had considerably more than normal rainfall and resulted in some local flooding, and Louisiana and Mississippi where the rainfall was somewhat above normal.

South Atlantic drainage:—Slight to moderate floods occurred in most of the rivers of the Atlantic slope as far north as the James River Basin. These rises resulted from moderately heavy precipitation from August 17–19 during the slow northeastward progress of the remnants of the tropical disturbance over that region. Damages were generally slight or moderate.

East Gulf of Mexico drainage:—Unusually heavy rains from August 12–17, inclusive, occurred over portions of central and southern Alabama and extreme northwestern Florida. These rains accompanied the passage inland over that region on August 12–13 of a tropical disturbance which has been referred to above. The heaviest amounts occurred mainly over the lower Choctawhatchee River Basin, the Pea and Conecuh Basins and portions of the Alabama River watershed.

Geneva, Ala., and Caryville and De Funiak Springs, Fla., in the Choctawhatchee River Basin reported 19.47, 21.17, and 21.29 inches, respectively, from the 12th to the 17th, inclusive. Geneva recorded a 24 hour amount of 9.55 inches on the morning of the 13th and Caryville 10 inches on the morning of the 14th. These intense rains resulted in moderately heavy floods in the Choctawhatchee and Conecuh Rivers from August 15 to 25.

In the Alabama River Basin the heaviest rains occurred in the Cahaba and Mulberry River watersheds. At Selma, Ala., the rainfall from August 12 to 17 amounted to 16.91 inches, and 17.85 inches was recorded in the vicinity of Marion, Ala., during the same period. The intense rainfall resulted in very rapid rises in the rivers. The Cahaba River crested at 31.6 feet at Centerville, Ala., about 8.5 feet above flood stage, and greater amounts of rain fell in the Cahaba Basin below that station. The heavy discharge from the Cahaba and Mulberry Rivers combined with the rise in the Alabama proper to produce a crest stage of 53.9 feet at Selma, Ala. (flood stage, 45 feet) on August 19, and 55.2 feet on the 21st at Millers Ferry, Ala. (flood stage 40 feet). At Montgomery, Ala., the highest stage was 42.6 feet on the 18th. The previous highest stages of record for these stations are as follows: Montgomery, 57.1 feet in 1919; Selma, 56.0 feet in 1929; and Millers Ferry, 56.6 feet in 1938.

A further rise occurred in the Conecuh and Choctawhatchee Rivers on September 30 in connection with a moderate tropical storm which struck the Louisiana coast on September 26. Heavy rains fell on the 25th and 26th in the lower portions of these drainage basins with the result that the lower Choctawhatchee River reached flood stage on September 30.

A table of flood losses during August and September follows:

Table of estimated flood losses during August and September 1939

River and drainage	Tangible property	Farm property including crops	Suspension of business	Total
SOUTH ATLANTIC DRAINAGE				
Rivers in North Carolina	$350	$185,000	$10,950	$196,300
Rivers in South Carolina	3,600	500	1,000	5,100
EAST GULF OF MEXICO DRAINAGE [1]				
Apalachicola River		1,000	3,000	4,000
Conecuh River	30,750	300,150	1,200	332,100
Choctawhatchee River	20,000	510,650	400	531,050
Alabama River [2]	631,000	1,577,000	6,500	2,214,500
Missouri River Basin				
Solomon River	42,750	38,200	2,000	82,950
WEST GULF OF MEXICO DRAINAGE				
Rio Grande	5,800	1,500		7,300
Colorado River Basin				
Gila River	12,950			12,950
Total	747,200	2,614,000	25,050	3,386,250

[1] No report received for Black Warrior-Tombigbee Rivers.
[2] Preliminary estimate.

Flood-stage report for August and September, 1939

[All dates in August unless otherwise specified]

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest Stage	Crest Date
ATLANTIC SLOPE DRAINAGE					
James:	*Feet*			*Feet*	
Columbia, Va	10	20	21	24.7	19–20
State Farm, Va	12	20	20	15.6	20
Richmond, Va	8	20	20	9.6	20
Dan: Danville, Va	11	19	20	12.4	20
Roanoke:					
Randolph, Va	21	19	21	26.9	21
Weldon, N. C	31	20	24	[1] 40.1	22
		29	30	[1] 35.3	29
Williamston, N. C	10	25	Sept. 7	11.3	28–29
Fishing Creek: Enfield, N. C	14	29	Sept. 2	17.0	31
Tar:					
Rocky Mount, N. C	8	21	22	8.1	22
		28	Sept. 2	13.2	30
Tarboro, N. C	18	31	Sept. 6	26.5	Sept. 3
Greenville, N. C	13	30	Sept. 8	19.1	Sept. 5
Neuse:					
Neuse, N. C	14	18	24	19.9	19
		28	Sept. 2	18.8	31
Smithfield, N. C	13	19	26	19.0	21–22
		29	Sept. 4	19.2	31
Goldsboro, N. C	14	23	Sept. 8	19.1	28
Kinston, N. C	14	27	Sept. 10	16.7	31–Sept. 1
Haw: Moncure, N. C	20	19	19	23.8	19
		28	29	22.0	29
Cape Fear:					
Fayetteville, N. C	35	20	21	39.8	20
		29	30	39.8	30
Lock No. 2, Elizabethtown, N. C	20	19	23	29.0	21
		29	Sept. 2	28.6	31
Pee Dee:					
Cheraw, S. C	30	19	21	35.2	20
Mars Bluff Bridge, S. C	17	21	29	19.0	24–25
Poston, S. C	18	28	29	18.3	29
Saluda: Pelzer, S. C	6	17	21	10.8	20
Chapells, S. C	13	19	22	17.4	21
Broad: Blairs, S. C	14	19	20	18.0	20
Santee:					
Rimini, S. C	12	21	28	13.4	24
		31	Sept. 1	12.3	31
Ferguson, S. C	12	24	Sept. 1	12.5	27–28
Broad: Carlton Bridge, Ga	15	18	[2] 20	22.6	18
Savannah:					
Butler Creek, Ga	21	19	21	23.4	20–21
Clyo, Ga	11	26	Sept. 3	14.4	29
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla	15	19	30	18.7	22
Choctawhatchee:					
Newton, Ala	19	18	18	19.6	18
Geneva, Ala	23	17	21	26.7	19
Caryville, Fla	12	14	26	14.8	19
		Sept. 30	Sept. 30	12.0	Sept. 30
Conecuh:					
River Falls, Ala	35	17	22	41.0	19
Brewton, Ala	17	19	24	20.4	22
Cahaba: Centerville, Ala	23	15	18	31.6	16
Alabama:					
Montgomery, Ala	35	16	20	42.6	18
Selma, Ala	45	16	22	53.9	19
Millers Ferry, Ala	40	16	27	55.2	21
Tombigbee:					
Lock No. 3	33	16	21	39.0	18
Lock No. 1	31	20	20	31.0	20
MISSISSIPPI SYSTEM					
Missouri Basin					
Solomon: Beloit, Kans	18	15	17	27.6	16
Ohio Basin					
French Broad: Asheville, N. C	6	18	18	7.2	18
Arkansas Basin					
North Canadian; Yukon, Okla	8	13	15	8.5	15

[1] Estimated.
[2] Estimated; gage washed away on the 19th.